INDIANA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT

CONTROL PROCEDURES FOR CLASSIFICATION OF AGGREGATES
ITM No. 203-14P

1.0 SCOPE.

1.1 This method covers the control procedures used for the classification of aggregates. This control is accomplished through a rational system of categories and subcategories as set out herein. The tests conducted on ledge and production samples will be in accordance with the applicable requirements of 904.

1.2 These procedures will be administered to protect the interests of the Department. When unforeseen situations or interpretation difficulties arise regarding these procedures, the resolution which provides the highest quality of materials to the Department will be considered as the deciding factor.

1.3 All sampling and testing of production and ledge quality samples will be conducted by the Department or by an AASHTO Accredited Laboratory acceptable to the Department. Test results from the AASHTO Accredited Laboratory will be reviewed to ensure compatibility with previous test results, if applicable.

1.4 The final quality approval of materials for Department use will be contingent on production quality test results. When production quality testing is conducted by an AASHTO Accredited Laboratory, final quality approval will be contingent on point-of-use samples tested by the Department. Test results for other than production quality will be assigned an L rating for information only. Instances where lower classification of ledge test results has been obtained may necessitate a series of production quality samples prior to a source classification and subsequent aggregate usage approval.

1.5 This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 ITM Standards.

210 Class AP Coarse Aggregate for Concrete Pavement and Slab-on-Grade Concrete

3.0 TERMINOLOGY.

3.1 AASHTO Accredited Laboratory**.** A laboratory which has demonstrated a proficiency in performing quality tests in accordance with the guidelines of the ASHTO Accreditation Program

3.2 Aggregate Specialist**.** An individual qualified to evaluate various aggregate deposits based on training in Earth Sciences. This person will be approved by the Department as being qualified to conduct various functions described in Department documents.

3.3 Category. Source classification used to determine the production quality sampling frequency

3.4 Certified Aggregate Producer (CAP). A source that has met all of the requirements to supply materials in accordance with 917

3.5 Class A. Quality rating assigned to aggregates which meet requirements for all Department uses except for specified slab on grade concrete applications

3.6 Class AP. Quality rating assigned to coarse aggregates permitted for use in all Department concrete, in particular, concrete pavement and specified slab-on-grade concrete uses in accordance with ITM 210

3.7 Class AS. Quality rating assigned to coarse aggregates permitted for use in SMA mixtures

3.8 Classes B, C, D, E, and F. Quality ratings assigned to aggregates with restricted uses

3.9 Class G. Quality rating assigned to materials which do not meet requirements for any Department use

3.10 Core Drilling Log. A written field description of a rock core sample and the operations

3.11 Core Sample. A rock sample obtained with a bit affixed to a barrel with drill rods that are advanced by a rotary drilling machine

3.12 Finished Material. Material which has been processed and proposed for use

3.13 Geologist. An individual qualified to evaluate various aggregate deposits based on knowledge of the principles of geology, acquired by professional education and practical experience. This person may be employed by

either the drilling consultant or aggregate source for the purpose of logging core descriptions and identifying ledges.

3.14 Ledge. Any stratigraphic unit which may be separated from adjacent units by lithologic differences

3.15 Ledge Sample. Core or face sample taken to represent ledges

3.16 New Source. Aggregate source that has never been assigned a Department source number, or does not have past ledge and production quality test results

3.17 Point-Of-Use Sample. Production quality sample obtained at the last opportunity prior to incorporation into the end use

3.18 Production Quality Sample. An aggregate sample representing finished materials obtained at the aggregate source or the point of use

3.19 Source. Facility that processes or handles aggregates. A redistribution terminal will be classified as a source.

3.20 Source Map. A map of the quarry showing critical features and operating areas.

3.21 Source Sample**.** Production quality sample representing finished materials that are stored at an aggregate source or redistribution terminal

3.22 Subcategory. Source classification based on results of tests conducted on source samples and used to determine the production quality sampling frequency

3.23 Rating L. A rating for information only

4.0 SIGNIFICANCE AND USE. This ITM shall be used to assign the category and subcategory classification, if applicable, for each source, and to establish the guidelines for continued approval of sources supplying aggregates for Department use.

5.0 SOURCE CATEGORY AND SUBCATEGORY CLASSIFICATIONS.

5.1 General. Each source will be assigned to one or more of four categories: GS, I, II, or III. Sources assigned to categories GS, I, or II will also be assigned to one of two subcategories: A or B. The Department reserves the right to reclassify a source at such time that reclassification is considered necessary.

5.2 Category GS. Category GS is assigned to all sources supplying gravel, natural sand, manufactured sand from sand and gravel, or slag products.

5.3 Category I. Category I is assigned to crushed stone sources that have finished products with only material from ledges with quality ratings equal to or higher than required for the proposed use, either through selective quarrying or natural occurrence.

5.4 Category II. Category II is assigned to crushed stone sources that include material from ledges with quality ratings lower than required for the proposed use in finished materials. Category II assignment is used to allow the source to include small percentages of materials from lesser quality ledges that cannot be economically removed by selective quarrying, and shall not significantly affect the results of tests conducted on production quality samples. Category II assignment is not intended to allow sources to blend large amounts of lesser quality materials so that the resulting production meets higher quality specifications. Category II is assigned when the source has demonstrated capability of consistently producing material of uniform quality. This capability generally is based on the results of production quality tests conducted over a reasonable period of time, but in some cases may be based on a combination of ledge and production sample quality test results. All new stone sources with no production quality history will be rated Category II, Subcategory B, unless Category III is assigned to the source.

5.5 Category III. Category III is assigned to sources which meet the requirements for Category II, but have not demonstrated a capability to consistently produce uniform products. Sand and gravel, and slag sources may be classified as Category III sources if the requirements of Category GS cannot be met. A Category III assignment is to allow any source to develop a production quality history that may eventually be used to justify a Category II or GS assignment. All Category III materials are processed, stockpiled, sampled, tested, and approved prior to use of the materials. Samples will be taken and tested as the stockpile is being built. Final acceptance will be determined when the stockpile is deemed completed. The source shall not add any material to a stockpile after the final sample has been taken. Material shall not be removed from the stockpile for non-Department use without notification to the Department prior to shipment.

5.6 Subcategory A or B. Subcategory assignment is based on the results of tests conducted on source samples. Sources with production quality test results which consistently fall in the lower 75 percent of the specification range for Class A material in accordance with Table I, are assigned to Subcategory A. Sources with multiple production quality test results which consistently fall above the 75 percent specification range for Class A material in accordance with Table I, or that have quality ratings affected by the deleterious content, are assigned to Subcategory B.

Numeric Values For 75% of the Specification Range (904.03(a))				
Size	**Minimum Size, (in.)**	**Absorption, (%)**	**Los Angeles Abrasion Loss, (%)**	**Freeze and Thaw Loss, (water (%))**
2	2 1/2	---	33.75	12.0
5	1 1/2	4.50	30.0	9.0
8	1	4.50	30.0	9.0
9	3/4	4.50	30.0	9.0
11	1/2	4.50	30.0	9.0
12	3/8	4.50	30.0	9.0
43	1 1/2	---	30.0	9.0
53	1 1/2	---	33.75	12.0
73	1	---	33.75	12.0
23	3/8	---	---	7.5
24	3/8	---	---	7.5

Table I

6.0 FREQUENCY OF SAMPLING FOR TESTING.

6.1 General. The minimum frequency for ledge and production quality sampling and testing shall be as outlined within this section.

New sources proposing to provide aggregates for Department use shall submit a written request to the appropriate District Testing Engineer. The request shall include the method of sampling and other pertinent information.

Sources only supplying aggregates for precast concrete items are not required to have ledge samples. Production quality samples will be required every two years. Point-of-use samples will be obtained when deemed necessary by the Department.

Aggregates for precast prestressed concrete items will require production quality sampling and testing. Point-of-use samples will be obtained when deemed necessary by the Department.

Reclassification of category and subcategory assignments of existing sources will be based on a review of the test results for the ledge and production quality samples, or production quality samples only for GS sources. The source shall request reclassification in writing to the appropriate District Testing Engineer. The Department Geologist will advise the source when a quality problem exists that may necessitate reclassification.

6.2 Ledge Samples. Ledge samples are required for the following conditions:

6.2.1 A new source requests Department approval

6.2.2 An existing crushed stone source encounters previously untested ledges

6.2.3 Significant changes occur in production quality test results indicating a possible variance within existing production ledges

6.2.4 At the request of the Producer to evaluate selective quarrying or reassignment of previous ledge quality test results

6.2.5 At such time that the Department implements a new quality control program, such as adoption of new aggregate quality specifications or tests, investigation of failed materials, or other situations that may occur

6.2.6 At such time that the Department determines a significant lithologic or stratigraphic change has occurred since the last ledge or production samples were obtained and tested

6.2.7 At such time that the Department determines that reactivated areas of approved crushed stone sources are required to be tested.

6.3 Production Quality Samples. Production quality samples are required for the following conditions:

6.3.1 Source samples.

a) In conjunction with ledge samples for crushed stone sources requesting initial Department approval
b) Gravel sources requesting initial Department approval
c) After initial Department approval in accordance with Table II

6.3.2 Point-of-Use samples**.** After initial Department approval in accordance with Table II

6.4 Testing Location. The location of testing for ledge and production quality samples will be as follows:

6.4.1 Ledge samples will be tested at the Office of Materials Management or an AASHTO Accredited Laboratory

6.4.2 Production quality samples that require L.A. Abrasion, absorption, crushed particles, and deleterious determination will be tested at the District laboratory. Production quality samples that require soundness determination and Micro-Deval determination, if applicable, will be tested at the Office of Materials Management or an AASHTO Accredited Laboratory.

6.4.3 Ledge and production quality samples tested at the AASHTO Accredited Laboratory will be given a SiteManager ID number and the test report from the laboratory will include this sample ID number.

Frequency for Sampling and Testing Source and Point-Of-Use Production Quality Samples			
Category	**Subcategory**	**Source Production Qualities**	**Point-Of-Use Production Qualities**
I	A	Every two years, Department sizes: 2; 5, or 8; 23 or 24 (Notes 1 and 3)	None, if all active ledges are Class A. One per year if selective quarrying and production is used to remove lesser quality materials. (Note 4)
I	B	Every year, Department sizes: 2; 5 or 8; 23 or 24 (Notes 1 and 3)	Two per year of any coarse size used and any fine size used. None in year when no material is used by the Department. (Notes 2 and 4)
II	A	Every year, Department sizes: 2; 5 or 8; 43, 53 or 73; 23 or 24 (Notes 1 and 3)	One per quarter of any coarse size used and any fine size used. None in quarter when no material is used by the Department. (Notes 2 and 4)
II	B	Every year, Department sizes: 2; 5 or 8; 43, 53 or 73; 23 or 24 (Notes 1 and 3)	One per month of any coarse size used and any fine size used. None in month when no material is used by the Department. (Notes 2 and 4)
III	--	Every year, every stockpile	See II B
GS	A	Every two years, Department sizes: 2; 5 or 8; 23 or 24 (Notes 1 and 3)	When deemed necessary by the Department.
GS	B	Every year, Department sizes: 2; 5 or 8; 23 or 24 (Notes 1 and 3)	When deemed necessary by the Department.

Notes:
1. Department approved dolomite and polish resistant aggregate sources will be sampled for size 11 or 1/2 in. material
2. The selection of the size sampled will be at random at each source.
3. Crushed and uncrushed gravel will be tested. Size 2 will be obtained when proposed for use in HMA mixtures.
4. Stone sand size 23 and size 24 will be sampled at the same frequency.

Table II

7.0 LEDGE SAMPLING.

7.1 General. The source shall be responsible for preparing a ledge sampling plan that is acceptable to the Department. Core sampling shall be the primary method of ledge sampling, with face sampling an allowable alternate. If unsafe conditions appear to exist, the source or the Department has the right to refuse to allow face sampling. The sampling and handling costs shall be the responsibility of the source.

7.2 Ledge Sampling Plan. The ledge sampling plan shall include, as a minimum, the following requirements:

7.2.1 The method for obtaining the ledge samples

7.2.2 Sampling locations identified on the latest available copy of the source map from the Annual Aggregate Source Report. Reef structures may necessitate sampling at predetermined mining levels.

7.2.3 Compliance with applicable current Mine Safety and Health Administration regulations

7.2.4 Identification of the Source Safety Officer responsible for enforcing all safety requirements

7.3 Ledge Identification. The rock type, texture, color and bedding shall be as indicated on IT-530Q. The GSA Rock Color Chart may be used as an additional reference.

7.4 Core Sampling. Core sampling shall be conducted in accordance with the following requirements:

7.4.1 The Department Geologist shall be notified prior to starting the coring operation. In the event that thin ledges are encountered with questionable ledge contacts, the District Testing Engineer shall be immediately notified if not present.

7.4.2 The Department Geologist will not direct the coring operation.

7.4.3 Cores shall be drilled a minimum of 30 ft apart and represent a maximum of the equivalent of two years of production, unless otherwise approved.

7.4.4 The source Geologist or Aggregate Specialist shall, in coordination with the Department Geologist, select the core locations, preliminarily identify the ledges, and determine the number of cores sufficient to obtain the required quantity of material.

A minimum of 35 lb of core sample shall be required for laboratory processing for each ledge. The approximate yield of a solid core per 1 ft is as follows:

Nominal Core Diameter	Weight (Mass) of Core
1.875 in	3.2 lb
2.000 in	3.6 lb
2.400 in.	5.2 lb
2.500 in.	5.6 lb
3.000 in.	8.1 lb
3.345 in.	10.1 lb
4.000 in.	14.4 lb
5.875 in.	31.1 lb

7.4.5 A minimum of three cores shall be properly taken, identified and stored.

7.4.6 The minimum ledge thickness for testing purposes shall be 1 ft.

7.4.7 The minimum core diameter shall be a nominal size of 1.875 in.

7.4.8 The source Geologist or Aggregate Specialist shall be responsible for completion of the Core Log TD-539 or other approved form, and the Ledge and Core Sample Description IT-530Q, and for the proper collecting, splitting, packaging, and shipping of the cores to the Office of Materials Management.

7.4.9 Rock core boxes shall be weatherproof and constructed of wood or other durable materials for the protection and storage of cores while en route from the drill site to the Office of Materials Management. All core boxes shall be provided with longitudinal separators.

Recovered cores shall be laid in the box from upper left to lower right. The top and bottom of each coring run shall be identified. Spacers, blocks, or plugs shall be marked and inserted into the core column within the separators to indicate the top and bottom of each coring run and zones of no core recovery.

Each box shall be marked on the outside to indicate the core or boring number, source number, numerical position of the box (e.g., hole X, box 2 of 7), depth of the top and bottom of the particular core run contained in that box, date of coring, possible formation and ledge contacts, and any other pertinent information.

The entire core column shall be put into the boxes and transported to a location for splitting. The split core will be reassembled and replaced in the core box in the pre-split position. The split cores shall be submitted to the Office of Materials Management after consultation with the Department Geologist.

7.4.10 The Department Geologist will examine the split cores and core drilling logs as prepared by the source Geologist or Aggregate Specialist. The following items shall be furnished as a minimum:

a) The core locations and elevations identified by grid coordinate or physical feature reference as marked on the latest available source map from the Annual Aggregate Source Report. The elevation of the bore hole shall be referenced and surveyed from a bench mark that has been previously tied into a U.S.C. & G.S. bench mark or other recognized bench mark.

b) A detailed description of each ledge for location, thickness, rock type, color, lithology, grain size, texture, bedding characteristics, elevation to the nearest 0**.**1 ft of the top and base of ledges, and any other pertinent observations. This information shall be indicated on IT-530Q.

c) Length of particular core run

d) Percent recovery. This information is used to determine the material that may have been washed away or for locating voids, and is determined as follows:

$$\text{Percent Recovery} = \frac{\text{Length Recovered}}{\text{Length of Core Run}} \text{ x } 100$$

e) Name of the Geologist or Aggregate Specialist, Department representative, and quarry representative present during the coring operation. If a particular boring is not completed during a given day, the date and depth of the drilling shall be noted.

f) Any miscellaneous information such as loss of water from the core hole, decreased or increased effort in coring by the drilling rig, or change in color of the wash cuttings. This information shall be listed in the remarks column with the approximate depth of occurrence.

7.4.11 The wall face to be represented by the cores shall be observed by the Department Geologist prior to final ledge designation and approval.

7.5 Face Sampling. Face sampling shall be conducted in accordance with the following requirements:

7.5.1 The source shall provide a means for the Department Geologist to closely examine the face of the wall to be sampled.

7.5.2 Ledges shall be identified in accordance with 7.3

7.5.3 A source Geologist or Aggregate Specialist shall participate with the Department Geologist in all face sampling at the site.

7.5.4 The source shall provide a minimum of 180 lb of material from each identified ledge.

7.5.5 The sample will consist of approximately 60 lb of representative material from each 1/3 of the identified ledge.

7.5.6 The Department Geologist will determine the acceptable quantity of material with concurrence of the source Geologist or Aggregate Specialist.

8.0 ANNUAL AGGREGATE SOURCE REPORT.

8.1 General. Crushed stone aggregate sources are required to submit an Annual Aggregate Source Report. The report may be submitted electronically or by hard copy. Sources that are not a Certified Aggregate Producer shall submit a report in accordance with 8.2. Certified Aggregate Producers shall submit a report in accordance with 8.2.1, 8.2.4, 8.2.5, 8.2.6, and 8.3, and include the report in the CAP Quality Control Plan.

8.2 Report.

8.2.1 Format. The report shall be typed, and if maps are hand drawn they shall be in a professional manner. Limited handwritten words will be acceptable on maps and figures. The Department source number and the report date shall be noted in a consistent location on each page of the report. An example of an acceptable Annual Aggregate Source Report is included in Appendix C.

8.2.2 Title Sheet**.** The report shall contain a title sheet that lists the following information:

a) The year for which the report is being submitted

b) Source name

c) Source number

d) Mailing address

e) Phone number

f) Fax number

g) Names of Management and Quality Control Personnel who are responsible for reporting to the Department

h) Source location identified by section, township, range, longitude, latitude, and nearest identifiable points such as highways, towns, etc.

8.2.3 Mineral Deposit Description. On a separate page, an explanation shall be included for the following:

a) Thickness of the current working benches

b) Class AP ledges and quality expiration dates

c) Ledges meeting dolomite and sandstone requirements and the most recent approval dates

d) Ledges requiring special handling procedures

e) The Department classification

f) Any significant differences in the stratigraphic section measurements and the respective ledge thickness as reported on the most recent Summary of Ledge Quality Results letter

8.2.4 Source Map. The report shall include a map of the mineral deposit. If the processing or stockpiling areas are on-site, the areas may be shown on the same map. If the processing or stockpiling areas are at another location, additional maps will be required. The map may be a drawing or an aerial photograph. The source map is required to be submitted once every two years. Each map shall include the following:

a) Title Block. The map shall display a title block containing as a minimum the source name, Department source code number, and submittal or revision date.

b) North Arrow**.** Each map shall display a North arrow.

c) Scale - Each map shall display a scale appropriate to the size of the property or source area; however, no scale shall be less than 1 in. = 100 ft and no greater than 1 in. = 400 ft, unless otherwise approved.

d) Grid. A grid shall be established using a rectangular coordinate system. The grid shall be indicated on the map either directly or using an overlay. The major grid lines shall be no further apart than 300 ft and incremented at least every 75 ft as measured on the map.

e) Benchmarks. At least one permanent benchmark shall be established on the property. All other points shall be referenced to the permanent benchmark through the true elevation. Temporary benchmarks shall also be established, and at least one benchmark shall be available for easy access to each ledge.

f) Control Points. Permanent control points for the grid shall be established within the property perimeter. There shall be enough permanent control points to permit the reestablishment of a portion of the grid within approximately one hour. The control points shall be close enough to the deposit such that all significant features may be conveniently and accurately referred to by standard survey methods.

g) Quarry Walls. All quarry walls, including the quarry outline and all active and inactive benches, shall be shown on the map. Each bench shall be discernable from other benches.

h) Proposed Operating Areas**.** All proposed operating areas for the year represented by the Annual Aggregate Source Report shall be clearly designated in some manner. The source is not committed to production from these areas, but shall designate the areas from which they anticipate production. The map may be revised at any time during the year if production is needed from areas that were not previously marked.

i) Critical Features**.** The map shall show all relative critical features including, as a minimum, the office, scales, testing laboratory, stockpile areas, processing plant areas, ramps, sumps, and pertinent quarry roads.

8.2.5 Legend**.** On the map or on a separate page, the source shall include a legend and map symbols appropriate to the source map.

8.2.6 Stratigraphic Section**.** On a separate page, the source shall include one or more source-specific stratigraphic sections. The stratigraphic sections shall be prepared to an appropriate scale to graphically and descriptively depict the stratigraphic relationships of the various lithologies within the current or anticipated production benches. The addition or deletion of ledges in a bench will require submittal of a new stratigraphic section when the change in the bench ledges occurs. Each stratigraphic section shall include, as a minimum, the following requirements:

a) The grid coordinates near where the section was measured

b) The lithologies above and below the current or anticipated production bench

c) The Department ledge numbers with the thickness, geologic formations and members names, elevation, and date of measurement given for the top of each bench

8.3 Submittal. No later than April 1st of each year, each source shall submit an Annual Aggregate Source Report to the appropriate District Testing Engineer. Failure to submit an Annual Aggregate Source Report shall result in rejection of the source to provide materials for Department use until such time that an acceptable report has been received by the District Testing Engineer.

Upon receipt of the report, the District Geologist will verify the contents of the report by field review with the Producer's representative designated in 8.2.2. A summary of this review will be forwarded with a signed cover letter from the District Testing Engineer to the Office of Materials Management. The District will retain one copy and forward another copy of the report to the Office of Materials Management for incorporation into the source QCP Appendix, if applicable. The source shall retain and include the report in their copy of the QCP, if applicable.

IT-530Q
Rev. 10/98

INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS & TESTS
LEDGE AND CORE SAMPLE DESCRIPTION

Date Sampled

YEAR LAB SUBMITTER SEQUENCE

Sampled By

SOURCE LOCATION

AREA FROM GRID MAP

X COORDINATE

Y COORDINATE

Section Township N or S

Range E or W

LEDGE INFORMATION

LEDGE NO. 52

LEDGE THICKNESS (0.01 m) 53

ELEV.- Top ledge (0.01 m) 54

ELEV.- Bottom 55

COLOR

SELECT PREDOMINATE GSA COLOR CODE

WET or DRY Surface
(Circle one)

STRATIGRAPHY

SYSTEM 72 2

FORMATION 74 2

MEMBER / BED 73 2

COLOR 75 2 5

GRAIN SIZE 76 2

BEDDING (Ingram 1954)

(Check The Three Prominant Characterisitcs)

51	Steeply Dipping	66	Discontinuous	
52	Crossbedded	67	Very Thickly Bedded	>1m
56	Contorted	68	Thickly Bedded	30-100 cm
61	Wavy	69	Medium Bedded	10-30 cm
62	Pinch & Swell	70	Thinly Bedded	3-10 cm
63	Irregular	71	Very Thinly Bedded	1-3 cm
64	Lenticular	72	Thickly Laminated	0.3-1 cm
65	Planar	73	Thinly Laminated	< 0.3 cm

ROCK TYPE 77 2

001	Limestone	004	Chert
002	Dolostone	005	Shale
003	Sandstone	006	Siltstone

CRYSTAL SIZE 79 2

GRAIN SIZE (Udden-Wentworth)

(Select One)

014	Cobbles	>64 mm	019	Medium	0.5-0.25 mm
015	Pebbles	64-4 mm	020	Fine	0.25-0.125 mm
016	Granular	4.0-2.0 mm	021	Very Fine	0.125-0.0625 mm
017	Very Coarse	2.0-1.0 mm	022	Silt	0.0625-0.0039 mm
018	Coarse	1.0-0.5 mm	023	Clay	< 0.0039 mm

CRYSTAL SIZE (Folk 1961)

(Select One)

024	Extremely Coarse	>4.0mm
017	Very Coarse	4.0-1.0mm
018	Coarse	1.0-0.25mm
019	Medium	0.25-0.062mm
020	Fine	0.062-0.016mm
021	Very Fine	0.016-0.004mm
025	Aphanocrystalline	<0.004mm

LITHOLOGY (Check The Four Prominant Characterisitcs)

01	Cherty	12	Arenaceous	23	Conglomeritic	34	Micritic	44	Siliceous
02	Clay Pocketed	13	Gypsiferous	24	Coralline	35	Mod. Sorted	45	Silty
03	Fossiliferous	14	Glauconitic	25	Crystalline	36	Mottled	46	Skeletal
04	Pelletal	15	Vuggy	26	Dense	37	Pisolitic	47	Sparry
05	Petroliferous	16	Iron Stained	27	Ferriferous	38	Poorly Indurated	48	Stromatolitic
06	Pyritic	17	Stylolitic	28	Fissile	39	Poorly Sorted	49	Sucrosic
07	Oolitic	18	Algal	29	Flaggy	40	Porous	50	Variegated
08	Argillaceous	19	Biociastic	30	Friable	41	Reefal	51	Vitreous
09	Weathered	20	Blebby	31	Intraclastic	42	Rubbly	52	Well-Indurated
10	Dolomitic	21	Brecciated	32	Lithographic	43	Shaly	53	Well-Sorted
11	Calcareous	22	Carbonaceous	33	Micaceous				

LITHOLOGY 85

BEDDING 86

TD-539

INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS
AGGREGATE CORE BORING LOG

CORE/LEDGE DESCRIPTION	INDOT Source #:	Hole No:	Sheet of
Producer:	Drilling Contractor:	Hole Dia:	Date Started:
Plant/Source:	Driller:	Total Depth:	Date Finished:
County:	Geologist:	Collar Elev:	Water Level:
D. H. Coordinates	X Y	Datum:	
Twp. ____ Rge. ____ Sec. ____ Quad. ____		Weather:	

Formation / Ledge / Graphic Log / Depth Scale	Lithologic Description (include in order: rock type, color, grain size, texture, bedding angle, weathering)	CORE DATA BOX / RUN	CORE DATA FROM / TO	% Recov.	Remarks

State Form 45230 (2-92)

EXAMPLE

AGGREGATE SOURCE REPORT

TITLE SHEET

Producer Name	Limerock Quarries Inc.
Address	P.O. Box 7-11
City, State	Markle, IN 47025
Phone #'s	219-328-7025
Fax	219-244-7025

1999
Annual Aggregate Source Report

Limerock Quarries Inc.
Markle Plant

INDOT Source #2799

Prepared For INDOT
Materials & Tests Division
120 S. Shortridge Rd.
Indianapolis, IN 46219-0389

Date Submitted
March 1, 1999

Source Location:	Section 11; T 27 N, R 10 E; 2.3 miles South of Markle, IN. One mile West of SR 3. Wells County; Longitude W 85°21'40", Latitude N 40°48'00"
Regional Manager:	Clay Mudstone
Superintendent:	Ferris Ore
Quality Control:	Richard Quality & Crystal Stone

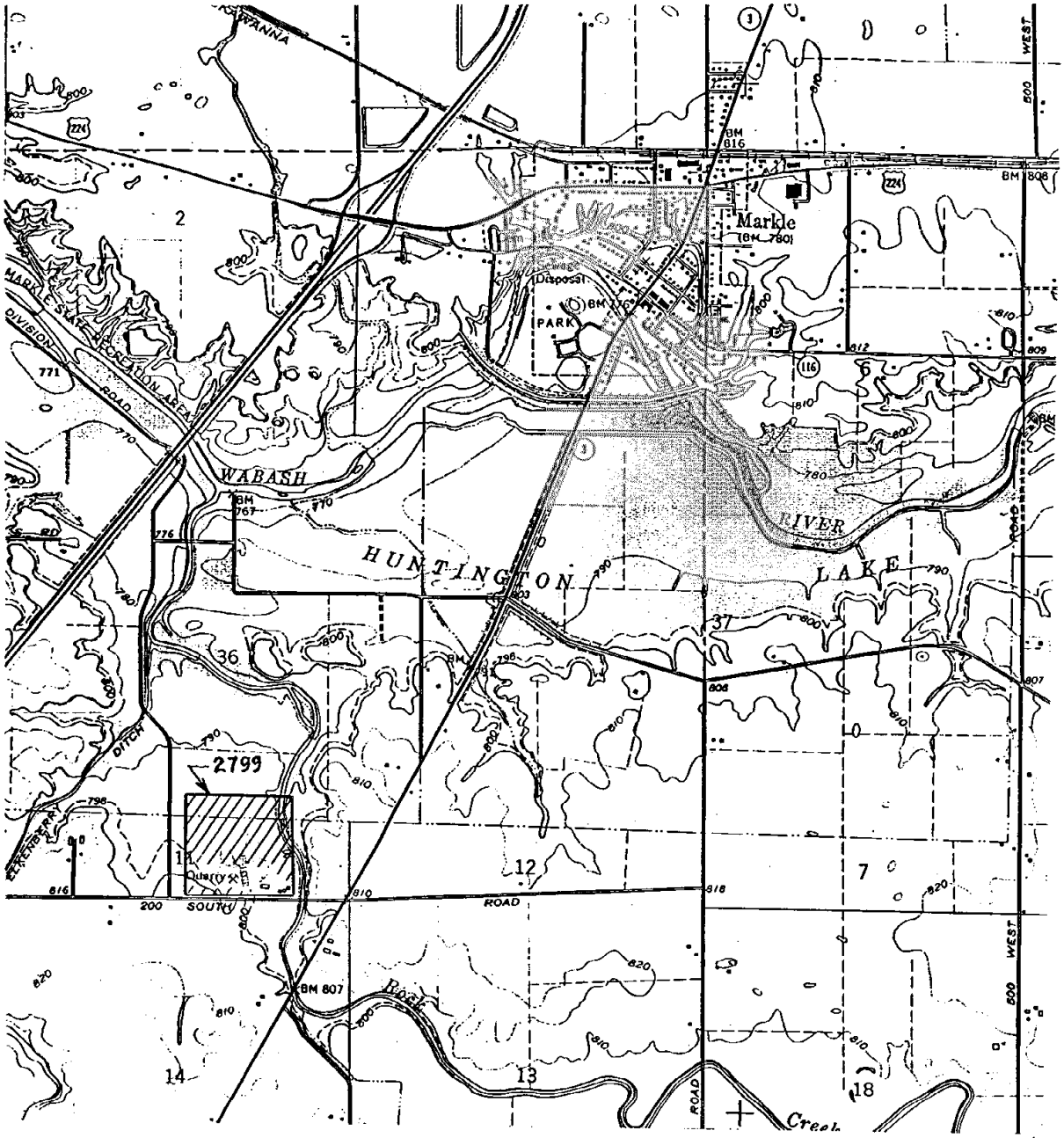
1/7
Source #2799
1-15-99

It is the intention of this report to satisfy the needs of Indiana Test Method (ITM) 203-99P, Section 8.0.

This source currently operates two open-pit benches. The upper bench is mined for commercial purposes only and consists of Ledges 1 and 2. This bench is approximately 60 feet thick. Ledge 3 is Waldron Shale and is wasted. the lower bench (Ledges 4 and 5) is approximately 73 feet thick, is classified as Category IA, and is INDOT Class AP approved up to March 15, 2001. Ledge 5 has a Magnesium content of 10.8 and is Dolomite Approved by INDOT.

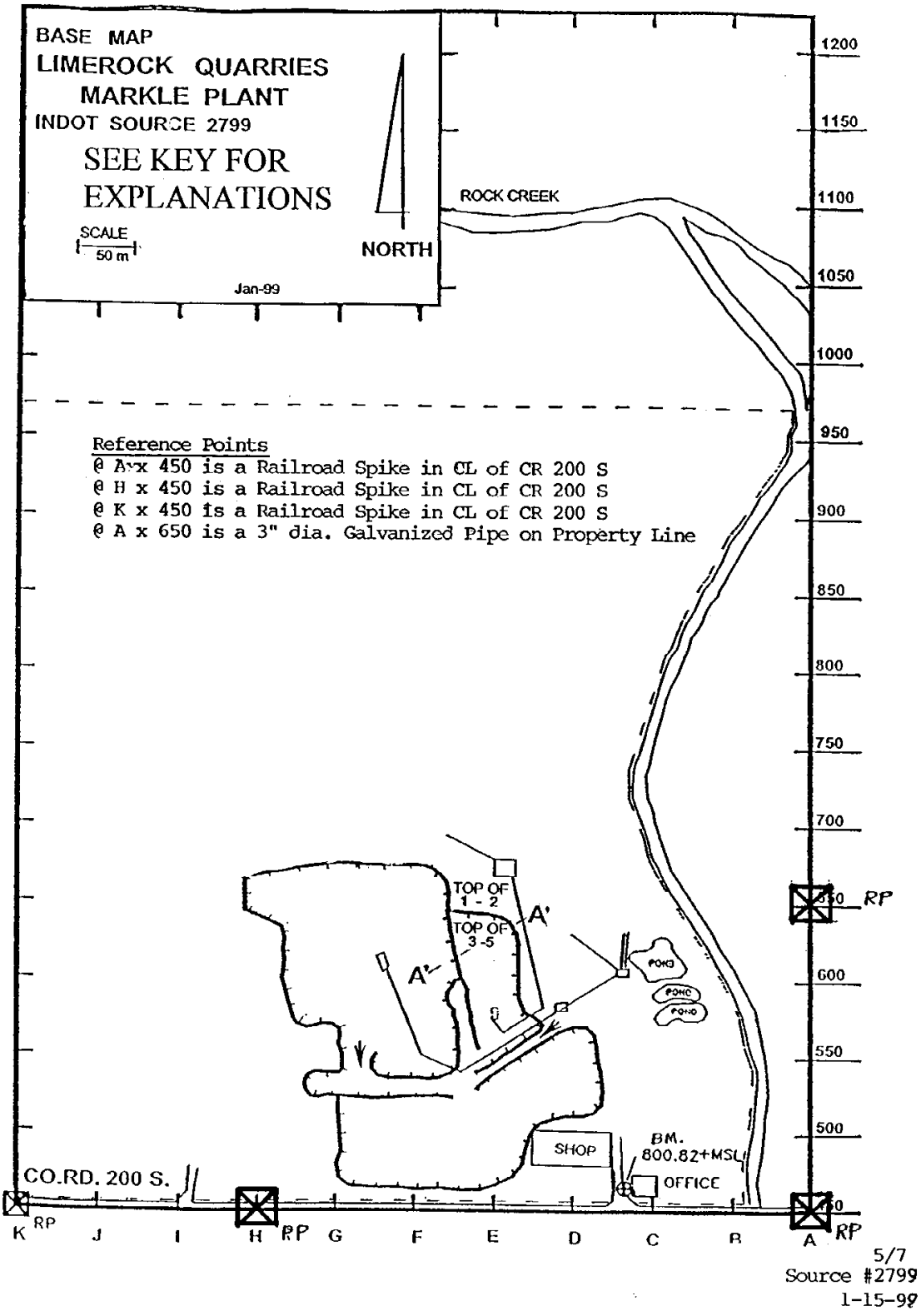
Elevations for all benches may be found on the following geologic cross-section. A benchmark with an elevation of 800.82 is located next to the office, which is southeast of the quarry. The proposed 1999 operating areas may be found on the following Source Map. Also included is the location map and quarry map indicating the stockpile areas. The symbol Legend and a Stratagraphic Description for this source are shown on the last two pages.

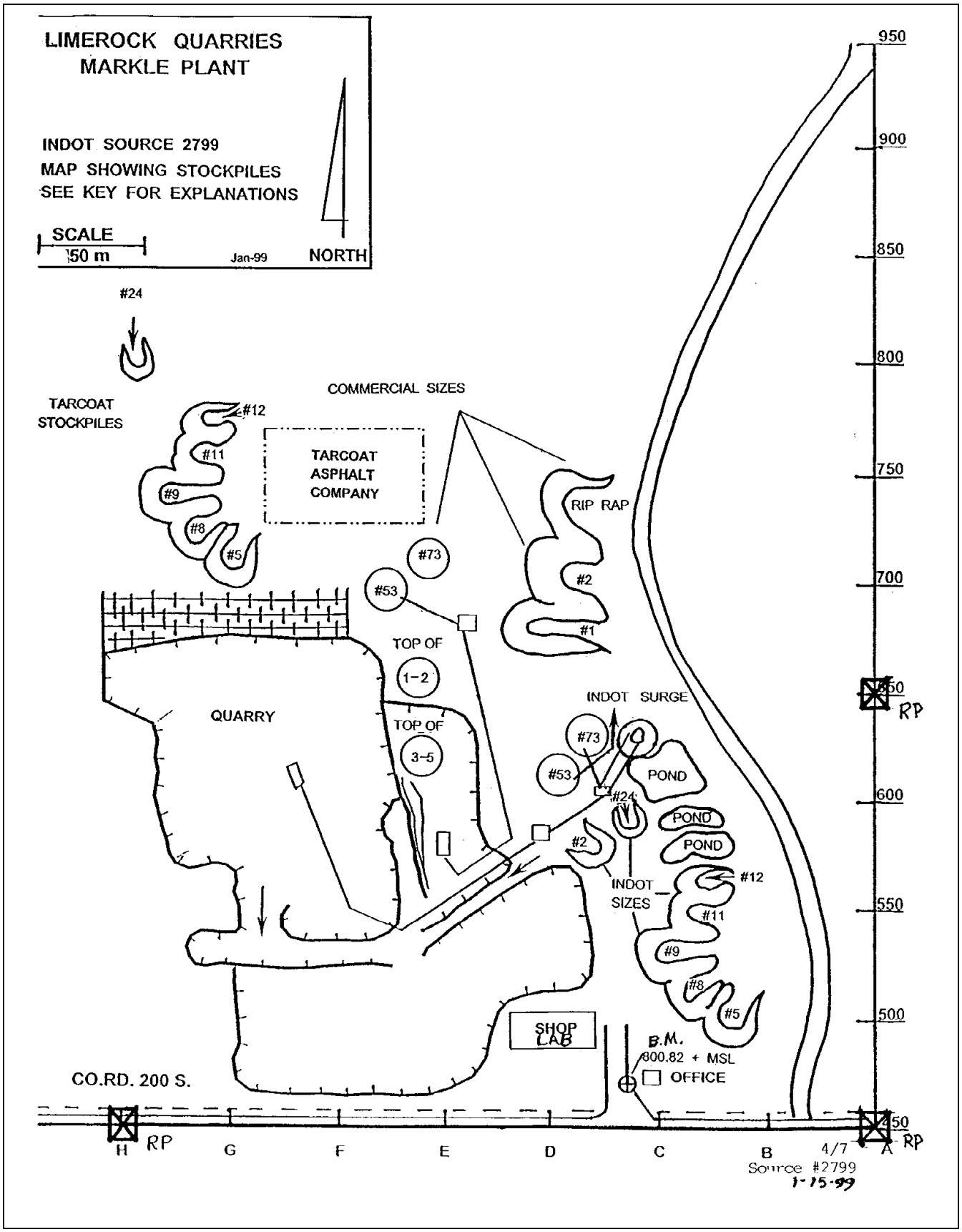
2/7
Source #2799
1-15-99



LOCATION MAP FOR LIMEROCK QUARRIES, INC.-MARKLE PLANT

3/7
Source #2799
1-15-99


BASE MAP
LIMEROCK QUARRIES
MARKLE PLANT
INDOT SOURCE 2799
SEE KEY FOR EXPLANATIONS
SCALE
50 m
NORTH
Jan-99
ROCK CREEK
Reference Points
@ Ax 450 is a Railroad Spike in CL of CR 200 S
@ H x 450 is a Railroad Spike in CL of CR 200 S
@ K x 450 is a Railroad Spike in CL of CR 200 S
@ A x 650 is a 3" dia. Galvanized Pipe on Property Line
TOP OF 1 - 2
TOP OF 3 -5
A'
A'
POND
POND
POND
SHOP
BM. 800.82+MSL
OFFICE
CO.RD. 200 S.
K RP
J
I
H RP
G
F
E
D
C
B
A RP
RP
1200
1150
1100
1050
1000
950
900
850
800
750
700
600
550
500
5/7
Source #2799
1-15-99


LIMEROCK QUARRIES
MARKLE PLANT
INDOT SOURCE 2799
MAP SHOWING STOCKPILES
SEE KEY FOR EXPLANATIONS
SCALE
50 m
Jan-99
NORTH
#24
TARCOAT
STOCKPILES
COMMERCIAL SIZES
#12
#11
#9
#8
#5
TARCOAT
ASPHALT
COMPANY
#73
#53
TOP OF
1-2
TOP OF
3-5
QUARRY
RIP RAP
#2
#1
INDOT SURGE
#73
#53
POND
#24
POND
POND
#2
#12
INDOT
SIZES
#11
#9
#8
#5
SHOP
LAB
B.M.
800.82 + MSL
OFFICE
CO.RD. 200 S.
950
900
850
800
750
700
650
RP
600
550
500
450
RP
H
RP
G
F
E
D
C
B
4/7
A
Source #2799
1-15-99

KEY TO QUARRY MAP FOR INDOT
LIMEROCK QUARRIES, INC.
MARKLE PLANT # 2799

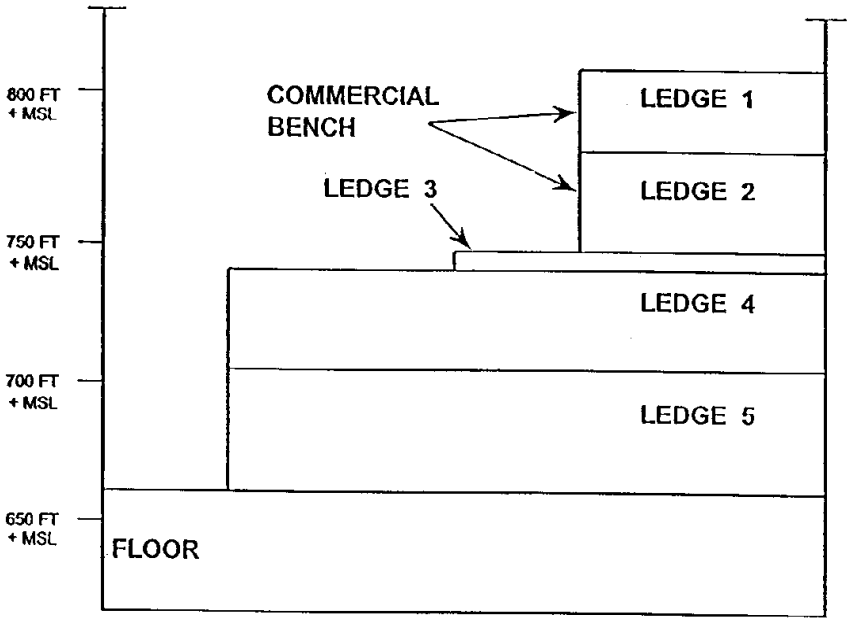
SYMBOL	EXPLANATION
⊕	PERMANENT BENCHMARK
⊕	TEMPORARY BENCHMARK
RP	REFERENCE POINT
UP →	RAMP ARROW - UP
DOWN ←	RAMP ARROW - DOWN
	BUILDINGS
	PLANT STRUCTURES
	INDOT STOCKPILES
	COMMERCIAL STOCKPILES
	MISC. STOCKPILES
	SURGEPILES

SYMBOL	EXPLANATION
	TAILINGS / FILL
	WATER BODIES
	QUARRY WALLS HANCHURES ON LOWER SIDE
	PROPOSED QUARRY AREA FOR CURRENT YEAR
	ROADS
	PROPERTY LINES
	PROPOSED OPERATING AREA FOR CURRENT YEAR
o C.H.	CORE HOLE

6/7
Source 2799
1-15-99

STRATIGRAPHIC DESCRIPTION
FOR LIMEROCK QUARRIES, INC.
MARKLE PLANT #2799

CORE LOCATIONS
F - 10 x 600 & E x 650



LEDGE	THICKNESS	GEOLOGIC FORMATION
1	20 '	LISTON CREEK
2	40'	MISSISSINEWA
3	5'	WALDRON
4	35'	LOUISVILLE
5	38'	LIMBERLOST

MARKLE PLANT - # 2799

* LEDGES 4 & 5 ARE AP APPROVED ; EXPIRES 12/12/99
* THIS SOURCE HAS AN INDOT IA CLASSIFICATION
*LEDGE #5 IS APPROVED DOLOMITE (10.8 Mg.)

7/7
Source #2799
1-15-99